MAX22191 Evaluation Kit

Evaluates: MAX22191

General Description

The MAX22191 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the functionality of the MAX22191 digital input in an optical isolator circuit. The EV kit features two circuits: one for a 24V digital input signal and one for a 48V input signal.

Features

- 24V and 48V Circuits for Easy Evaluation
- Proven PCB Layout
- Fully Assembled and Tested

***Ordering Information* appears at end of data sheet.**

Quick Start

Required Equipment

- MAX22191 EV kit
- 24V Digital signal generator
- Oscilloscope

Startup Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Ensure that the jumpers are in the default position (Table 1).
2) Connect the digital signal generator to the IN+ test point (TP3) and IN- test point (TP4).
3) Connect the oscilloscope to the IN+ test point (TP3), and the OUT (TP14) test point. Connect return terminals to the IN- test point (TP4)
4) Set the digital signal generator to generate a 0V–24V 2kHz pulse.
5) Turn on the digital signal generator.
6) Monitor the IN+ and OUT signals. Verify that the OUT signal toggles as expected.

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Detailed Description of Hardware

The MAX22191 EV kit is a fully assembled and tested circuit board for evaluating the MAX22191 digital input (DI) with either a 24V or 48V input.

Powering the MAX22191 EV Kit

The MAX22191 can be powered parasitically, from the signal on IN, or from a local V_{CC} supply. To power the circuit parasitcally, ensure that the V_{CC} jumper is set to LOW (J9 or J10 is 2-3) and apply a digital input signal to IN+.

To power the circuit from a local power supply, connect the V_{CC} jumper to 'TP' (J9 or J10 to 1-2) and apply a 3V to 5.5V supply to the V_{CC} test point.

Selecting the Test Circuit (24V or 48V)

The MAX22191 EV kit supports 0-24V or 0-48V digital input (DI) signals. These circuits are clearly labeled on the silkscreen.

In the 48V circuit, R1 and R2 are using to shift the input voltage, such that the IEC 61131-2 thresholds are met for a 48V input signal. Additionally, R1 limits surge current, allowing for a higher voltage TVS clamp on the input.

Apply the digital input (DI) signal to the J1 terminal block when using signal voltages above 30V. Apply the DI signal to the J2 terminal block when using signal voltages below 30V.

Testing the MAX22191 as a Current-Sinking Input

The MAX22191 EV kit can be used to evaluate the device in either a current sinking or current sourcing configuration.

To test the MAX22191 as a current sinking input, connect the proximity sensor/switch to the IN+ test point (TP1 or TP3) or terminal block (J1 or J2) on the EV kit. Connect the negative/return terminal of the sensor/switch to positive output of the 24V or 48V supply. Connect the return terminal of the supply to the IN- test point (TP2 or TP4) or terminal block (J1 or J2).

Testing the MAX22191 as a Current Sourcing Input

The MAX22191 EV kit can be used to evaluate the device in either a current sinking or current sourcing configuration.

To test the MAX22191 as a current sourcing input, connect the proximity sensor/switch to the negative terminal of the 24V or 48V supply. Connect the positive terminal of the supply to to the IN+ test point (TP1 or TP3) or terminal block (J1 or J2) on the EV kit. Connect the negative/return terminal of the sensor/switch to IN- test point (TP2 or TP4) or terminal block (J1 or J2).

Evaluating the MAX22191 with an Optical Isolator (V_{CC} = 0V)

The MAX22191 includes an on-board high-speed optical isolator for easy evaluation. To use the optical isolator, set V_{CC} = 0V (J9 or J10 to 2-3) and connect an isolated supply between 2.7V and 5.5 to the V_{DD} test point (TP9 or TP11) on the isolated side of the board. Connect an oscillopscope to the VO test point (TP10 or TP12) to see the output of the isolator switch as the input signal (IN+) switches.

Evaluating the MAX22191 with an Optical Isolator (3V ≤ V_{CC} 5.5V)

OUT is a push-pull buffered output when V_{CC} is present. Remove the R13 or R15 resistor and connect a resistive load to R9/R10 to test functionality in this mode.

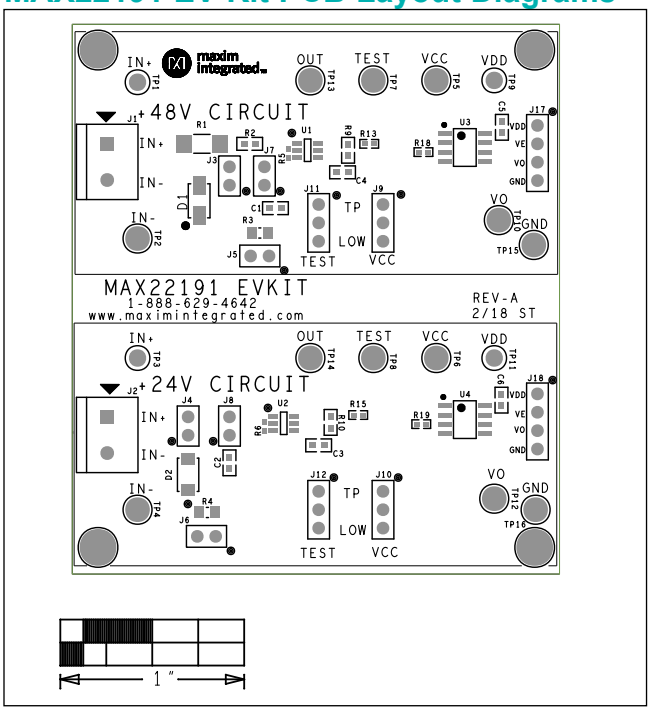
Table 1. Jumper Table (J3–J12)

JUMPER	SHUNT POSITION	DESCRIPTION
J3	Open	58V TVS diode connected to IN+ on 48V circuit.
	Closed*	58V TVS diode not connected to IN+ on 48V circuit.
J4	Open	33V TVS diode connected to IN+ on 24V circuit.
	Closed*	33V TVS diode not connected to IN+ on 24V circuit.
J5	**Open***	10Ω resistor connected between IN- and GND pin on IC on 48V circuit. This resistor can be used to monitor return current.
	Closed	IN- is connected directly to GND pin on the IC on the 48V circuit.
J6	**Open***	10Ω resistor connected between IN- and GND pin on IC on 24V circuit. This resistor can be used to monitor return current.
	Closed	IN- is connected directly to GND pin on the IC on the 24V circuit.
J7	**Open***	10nF capacitor connected to IN+ on 48V circuit.
	Closed	10nF capacitor not connected to IN+ on 48V circuit.
J8	**Open***	10nF capacitor connected to IN+ on 24V circuit.
	Closed	10nF capacitor not connected to IN+ on 24V circuit.
J9	1-2	VCC is connected low on the 48V circuit.
	2-3*	VCC is connected to the test point (TP5) on the 48V circuit. Connect an external 3V to 5.5V supply to VCC to power the device.
J10	1-2	VCC is connected low on the 24V circuit.
	2-3*	VCC is connected to the test point (TP6) on the 24V circuit. Connect an external 3V to 5.5V supply to VCC to power the device.
J11	1-2	TEST is connected to GND on the 48V circuit.
	2-3*	TEST is connected to the TEST test point (TP7) on the 48V circuit.
J12	1-2	TEST is connected to GND on the 24V circuit.
	2-3*	TEST is connected to the TEST test point (TP8) on the 24V circuit.

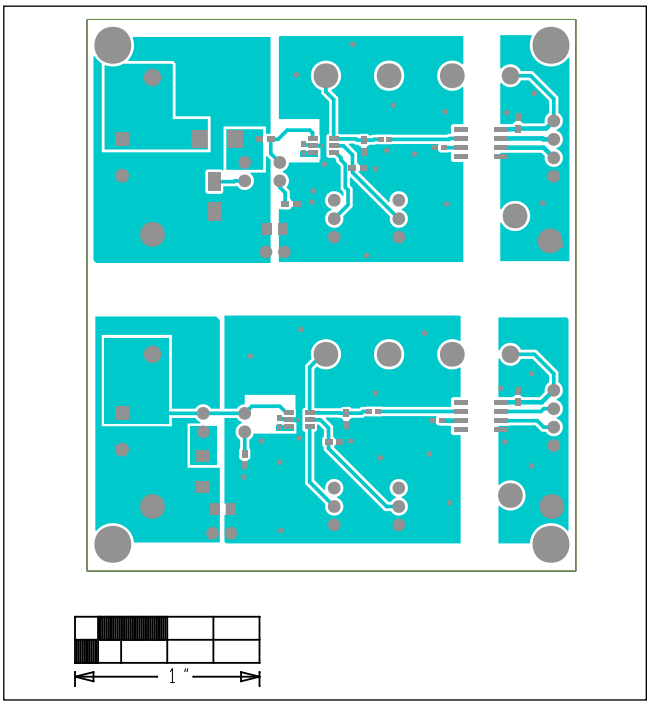
MAX22191 EV Kit Bill of Materials

ITEM	REF_ DES	DNI/DNP	QTY	MFG PART #	MFG	VALUE	DESCRIPTION
1	C1, C2, C5, C6	-	4	GRM188R72A103KA01	MURATA	0.01UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.01UF ; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	C3, C4	-	2	GRM188R61A105KA61; C1608X5R1A105K	MURATA; TDK	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 10V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R;
3	D1	-	1	SMAJ58CA	DIODES INCORPORATED	58V	DIODE; TVS; SMA; VRM=58V; IPP=4.3A
4	D2	-	1	SMAJ33CA	VISHAY GENERAL SEMICONDUCTOR	33V	DIODE; TVS; SMA (DO-214AC); VRM=33V; IPP=7.5A
5	J1, J2	-	2	1729018	PHOENIX CONTACT	1729018	CONNECTOR; FEMALE; THROUGH HOLE; GREEN TERMINAL BLOCK; RIGHT ANGLE; 2PINS
6	J3-J8	-	6	TSW-102-23-G-S	SAMTEC	TSW-102-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 2PINS; -55 DEGC TO +125 DEGC
7	J9-J12	-	4	TSW-103-23-G-S	SAMTEC	TSW-103-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS; -55 DEGC TO +125 DEGC
8	J17, J18	-	2	TSW-104-23-G-S	SAMTEC	TSW-104-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 4PINS
9	R1	-	1	CMB02070X1501G	VISHAY BEYSCHLAG	1.5K	RESISTOR; SMT; 1.5K OHM; 2%; 1W; CARBON FILM
10	R2	-	1	CRCW06031K20FK	VISHAY DALE	1.2K	RESISTOR; 0603; 1.2K; 1%; 100PPM; 0.10W; THICK FILM
11	R3, R4	-	2	CRCW080510R0FK;ERJ-6ENF10R0V	VISHAY DALE;PANASONIC	10	RESISTOR, 0805, 10 OHM, 1%, 100PPM, 0.125W, THICK FILM
12	R5, R6	-	2	CRCW040240K2FK	VISHAY DALE	40.2K	RESISTOR; 0402; 40.2K OHM; 1%; 100PPM; 0.063W; THICK FILM
13	R11, R12	-	2	CRCW060310K0FK;ERJ-3EKF1002	VISHAY DALE;PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM
14	R13, R15, R18, R19	-	4	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP;VENKEL LTD.	0	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
15	TP1, TP3, TP9, TP11	-	4	5010	KEYSTONE	N/A	TESTPOINT WITH 1.80MM HOLE DIA, RED, MULTIPURPOSE;
16	TP2, TP4, TP15, TP16	-	4	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
17	TP5-TP8, TP10, TP12-TP14	-	8	5014	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; YELLOW; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
18	U1, U2	-	2	MAX22191AUT+	MAXIM	MAX22191AUT+	EVKIT PART-IC; PARASITICALLY POWERED TYPE 3 DIGITAL INPUT; PACKAGE DWG NO.: 21-0058; PACKAGE LAND PATTERN: 90-0175; SOT23-6
19	U3, U4	-	2	ACPL-061L-560E	BROADCOM LIMITED	ACPL-061L-560E	IC; OPTO; ULTRA LOW POWER 10MBD DIGITAL CMOS OPTOCOUPLER; NSOIC8
20	PCB	-	1	MAX22191	MAXIM	PCB	PCB:MAX22191
21	R9, R10	DNP	0	CRCW06031K50FK	VISHAY DALE	1.5K	RESISTOR; 0603; 1.5K; 1%; 100PPM; 0.10W; THICK FILM
22	R16, R17	DNP	0	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP;VENKEL LTD.	0	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
NOTE: DNI--> DO NOT INSTALL(PACKOUT) ; DNP--> DO NOT PROCURE							
TOTAL			55				

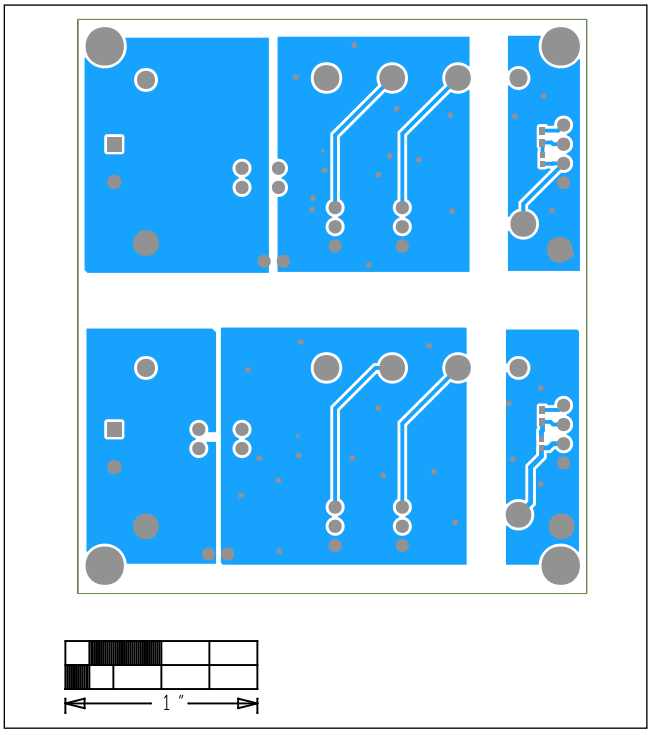
MAX22191 EV Kit PCB Layout Diagrams



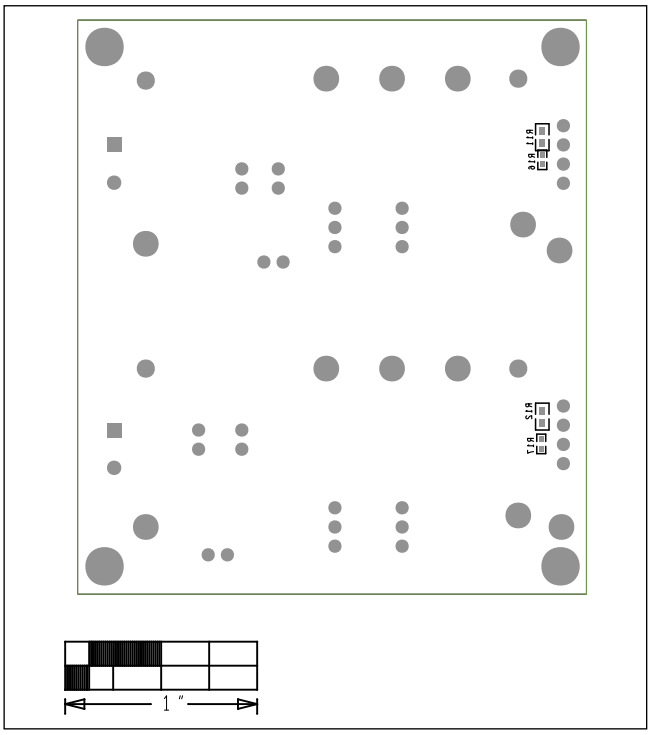
MAX22191 EV Kit—Top Silkscreen



MAX22191 EV Kit—Top

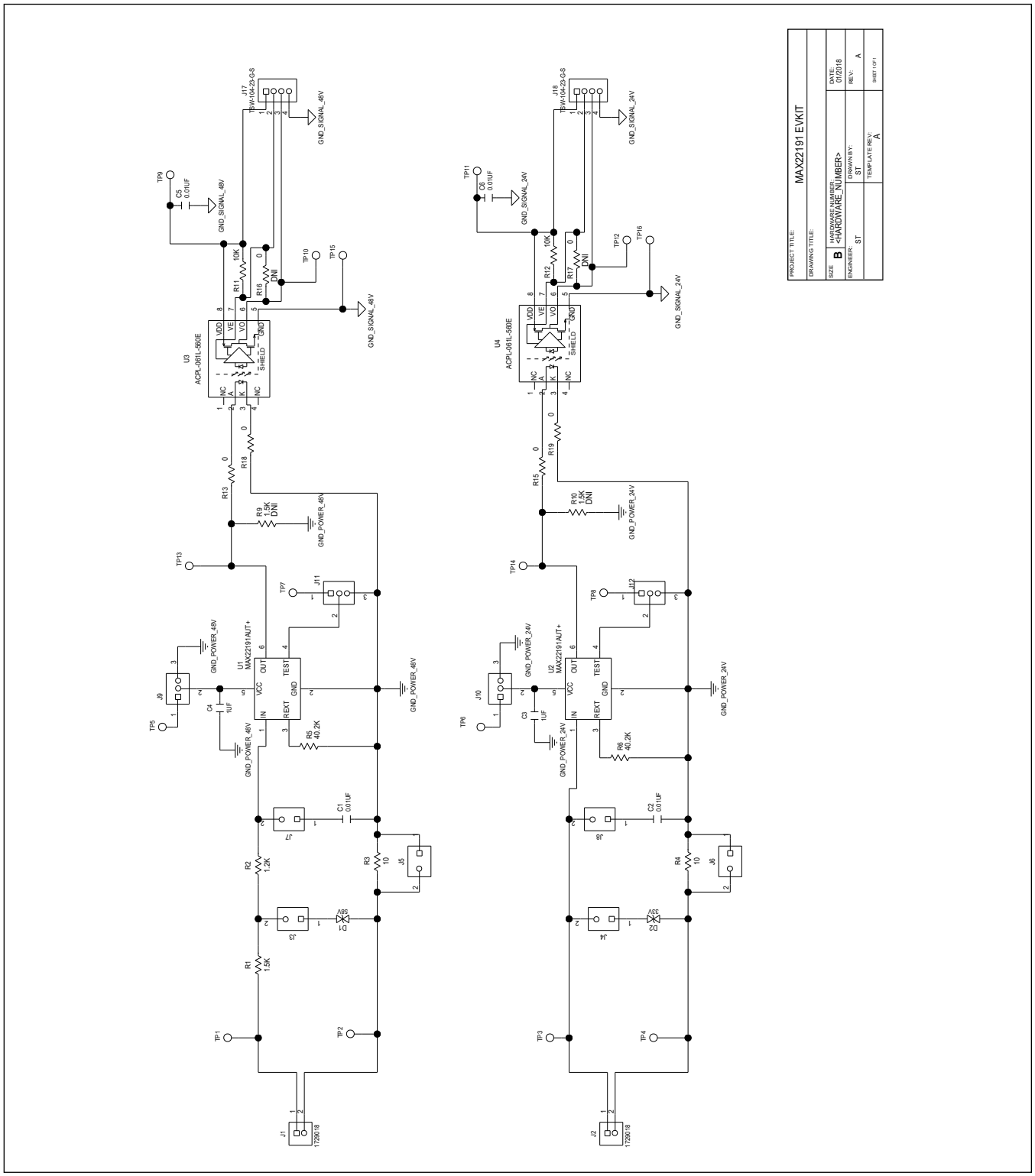


MAX22191 EV Kit—Top Silkscreen



MAX22191 EV Kit—Top Silkscreen

MAX22191 EV Kit Schematic



Ordering Information

PART	TYPE
MAX22191EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/18	Initial release	—

